

integrity to the job today it's Allan."

Bromley clearly has the support of the scientific community but he still needs the vote of the Senate for confirmation as science adviser. Senate approval is likely to come this month.

At Yale, where he has been since 1960, colleagues characterize Bromley as "a gifted teacher" and "an outstanding researcher." As Yale's Henry Ford II Professor of Physics and founder and director of the A. W. Wright Nuclear Structure Laboratory, Bromley has investigated the

structure and dynamics of nuclei and earned for himself the title of "father" of modern heavy-ion work. Under Bromley the Wright lab has produced more PhD's in experimental nuclear physics than any other facility in the world.

In August 1987, the Wright tandem van de Graaf accelerator, known affectionately as the Emperor, completed an \$11 million upgrade from 13 MV to 23 MV, and Bromley got Bush, then Vice President, to deliver the dedication. "It was a real coup and everyone knew it," says the laborato-

ry's associate director, Peter Parker, who is to become Wright's director.

Bromley is celebrated on campus as one of Yale's most popular teachers. For a dozen years he has taught a science policy course that fills the lecture hall in the Sloane Physics Building. New students are initially in awe of him, say fellow professors. "He is an imposing figure," says Tom Applequist. "He's a showman as well as a serious world-class scientist. His lectures have pizzazz. That will be useful in Washington."

—IRWIN GOODWIN

BY CONTRAST TO LAST ACADEMY ADDRESS, PRESS IS HOPEFUL FOR SCIENCE...IF...

In his annual address to the National Academy of Sciences on 25 April, Frank Press was positively ebullient, overcoming even a case of flu, on the future of US science. This was in marked contrast to last year when he scolded scientists to make up their minds about what they wanted from government (PHYSICS TODAY, June 1988, page 49). It was purely coincidental that only a few days before, D. Allan Bromley was President Bush's choice for science adviser. In other circumstances, Press, himself the top scientist to President Carter, might have proposed himself for the job.

The title of his speech, "How to Run American Science (Successfully)," suggested that Press had the answers to the many problems that beset US science, ranging from public illiteracy and indifference to insufficient government funding for education and research. He began his talk with a paradox: While America's scientific contribution is the best in the world, US scientists see the system under stress.

"We see superb opportunities in science foregone for lack of funding, promising students disenchanted by the financial and regulatory demands of research, and the administrative burdens and costs on science ever heavier," says Press. "As a distinguished member wrote me, 'We need more and more money to do less and less.'"

Unfortunately, Press does not deal with the academy member's dilemma. Instead, he heaps praise on the funds provided by the Administration and Congress in the last few years "in the face of a fierce deficit" and on the "remarkable upwelling of support for research" from the states. Federal funding of R&D in fiscal 1989 is nearly \$64 billion, with \$10.2 billion

of that going to basic science. That's 10% more than the previous year's outlay for basic research—a real growth of 6% once inflation is discounted. The states, meanwhile, are adding another \$500 million annually for scientific and technical programs, according to Press.

That's not enough, Press contends. He would like to accelerate the rate of government funding—"to double Federal investments in basic science over five years for all agencies with science in their missions, just as President Bush proposes to do for the National Science Foundation." That requires an annual growth rate of about 14%.

The additional money would enable the agencies to support a larger proportion of worthy research grants and assure greater outlays for training, equipment and other scientific activities, he argues. This is Dr. Pangloss's vision of the best of all possible worlds, of course, and Press realizes that such a hefty increase might be attainable incrementally if some of the megaprojects are postponed until the nation's mammoth budget deficit is reduced. But when the research budget is doubled, declares Press, nirvana would exist: "It would make it possible to experiment with new institutional concepts such as centers and increase grants to individual scientists at the same time. It would help support the best superprojects. It would begin to make it possible to extend the geographic reach of the scientific enterprise, allowing aspiring institutions to reach higher. And, surprisingly, the added cost to the nation over five years would be modest—about \$10 billion."

Press admits that the cost of research is rising rapidly, in part because of new developments. "List the recent examples of breakthroughs in

science and you will inevitably find a new instrument—typically, a more sophisticated and expensive one," he told his audience. "Indeed, a good part of the excitement of science in the past year comes out of new instrumentation: the scanning tunneling microscope for visualizing atoms, the increasing set of 'impossible experiments' that can be done by supercomputers, techniques such as capillary electrophoresis that can follow chemical changes in single neurons, or an incredible set of new tools for deciphering DNA structure.... My visits to university laboratories tell me that many of our best people still lack essential pieces of modern equipment—a need that deserves increased attention in the allocation of funds by all agencies whose missions depend on university science."

Press's complaints about equipment and building shortages at universities sound remarkably like the 1986 report of the White House Science Council on the health of US research universities, known in science policy circles as the Packard-Bromley Report, after David Packard, chairman of Hewlett-Packard and D. Allan Bromley (PHYSICS TODAY, March 1986, page 65). Press, like the Packard-Bromley Report and the bills proposed, respectively, by the former and current chairmen of the House science committee, advocates a national facilities act to provide the academic infrastructure necessary for advancing scientific studies. In his ledger, Press calculates that \$1.25 billion per year might be spent for refurbishing and constructing laboratories and buildings on campuses.

While he welcomes President Bush's initiative to provide 570 scholarships to high school graduates who have excelled in science and math,

Press is appalled by accounts that a smaller fraction of the best and brightest US students are attracted to science. "It is argued that 'market forces' determine student choices, as ideally they should; that, as in the past, immigrants will fill the vacancies. Perhaps. But we cannot rely on the slow response and uncertain outcome of the labor market to deal with a national crisis," says Press. "I believe we urgently need an extraordinary and coordinated response that deals with the deficits of science

education, attacks the poor public image of science and better supports talented students wishing to embark on careers in science."

He calls for a campaign involving scientific and educational societies working with the media to improve the image of science as a career, breaking down the often antagonistic stereotypes of the "mad scientist" portrayed in films like "Dr. Strangelove" and even television sitcoms such as CBS's "Murphy Brown." Press likes the proposal by Richard Atkin-

son of the University of California at San Diego to create 3000 graduate fellowships in science and engineering to make up the shortfall in PhDs.

Press also believes the "quality of life" for scientists needs improving. The size of the average grant needs to be increased and the quantity of paperwork reduced. Some of Press's concerns require more sensitive management by university administrators and government bureaucrats if the American scientific enterprise is to run successfully. —IRWIN GOODWIN

WASHINGTON INS & OUTS KNAPP RESIGNS FROM URA LEADERSHIP; TRULY TO PILOT NASA, FIELDS AT DARPA

The board of trustees for Universities Research Association evinced some surprise at its meeting on 18 April when **Edward A. Knapp** announced his resignation as director of the organization. URA is the consortium of 72 universities in the US and Canada that operates Fermilab under contract to the Department of Energy and manages the proposed Superconducting Super Collider, to be built around Waxahachie, Texas. He is leaving URA, he explained, to pursue accelerator research at Los Alamos, from which he has been on leave of absence since 1985, and to continue his work at CERN on NA-12 Gams. The latter is an international fixed-target experiment, using the Super Proton Synchrotron, which seeks to understand the spectroscopy of low-mass mesons, including hybrid and "glueball" states.

Knapp has agreed to stay with URA until the end of the year, unless a new president is chosen earlier. "I'm not in any real hurry to leave," Knapp said in an interview. "When I came on board, I made it plain that I was doing so on a temporary basis—to do what I could to make the SSC a reality. Now that URA has a contract from the Energy Department to manage the SSC for its first nine years, now that Roy Schwitters has been chosen the first director of the collider project and now that John Peoples has been selected to succeed Leon Lederman as the head of Fermilab, it's time for a new person to take charge of the next stage of development."

Several physicists associated with the SSC have alluded to discord between Knapp and Robert O. Hunter Jr, director of DOE's Office of Energy Research. Hunter is accused of seek-

ing to "nanomanage" the project and of refusing to consult URA officials about anything to do with the SSC. Some say Knapp has not been assertive enough with DOE executives and has not made his problems known to sympathetic members of Congress.

Responding to these critics, Knapp says that his decision to return to research was made long before management differences arose with DOE and that serious discord with Hunter is news to him. "I believe I have led URA on a path that is realistic considering the political realities of the times," he says. "A more aggressive stance or Congressional interference would have been disastrous to the project."

Washington wags recall that Knapp resigned from the National Science Foundation just as abruptly in May 1984. His Senate confirmation took place amid charges that he sought to "politicize" the agency by firing three top foundation officials (PHYSICS TODAY, July 1983, page 60). He left NSF, he asserted at the time, because he longed to return to Los Alamos. During his two years as director, NSF experienced the largest budget increases in two decades—up 31% for research and related activities and 37% for the whole agency. "Honestly, I wanted to get back to my experiments then and I want to get a soldering iron back in my hand," he says.

It is no secret, though, that the SSC is on hold right now. The next phase awaits the decision of Congress whether to provide \$250 million in fiscal 1990, which begins on 1 October, to begin construction. In this project, however, construction during the first year means gathering geological site-specific data so that the preliminary

design engineering can proceed, and developing industrial certification for the 10 000 dipole magnets that are necessary for the 53-mile oval-shaped accelerator. The only construction at the site will be test labs for magnets and for cryogenics.

Another reason that SSC now seems to be immobilized is that newly appointed Energy Secretary James D. Watkins is making a complete review of DOE structure and practices. Knapp calls Watkins's actions "DOE soul searching." He quickly adds: "What Admiral Watkins is doing is exactly right. He's looking carefully at what's gone wrong and what's gone right."

President Bush announced on 12 April that he would nominate Rear Admiral **Richard H. Truly** as NASA administrator. For the past two years, Truly has served as associate administrator for space flight, which put him in the agency's "hot seat" for returning the space shuttle to flight after the Challenger disaster. Prior to joining NASA he was the first commander of the Naval Space Command, based in Dahlgren, Virginia. If confirmed by the Senate, Truly will succeed **James C. Fletcher**, who resigned his second hitch as NASA chief on 8 April. Actually, Truly became NASA's acting administrator on 15 May, when **Dale D. Myers**, who was Fletcher's deputy and became acting administrator when Fletcher departed, also left on 12 May.

At a brief ceremony in the White House's Roosevelt Room, Bush introduced Truly as a "hero" of NASA's own making. Truly will become the first astronaut to command the whole space agency. He was the pilot